

## **ABSTRACT of the Disclosure**

### **Method for the removal of multi-valent cations from the aqueous solution by means of concentrated silica dispersion as adsorbent in selective dialysis**

*Inventors: Andrei Dukhin, Stanislav Dukhin, Philip J. Goetz*

The process of heavy metals removal from the waste water using silica dispersion without mixing silica dispersion with the waste water. This is achieved due to the membrane device where silica dispersion and waste water stream are separated by membrane with pore sizes smaller than size of the silica particles. The process is organized as counter-flow, which means that silica dispersion and waste water flow in the opposite directions. This provides the maximum utilization of the adsorption capacity corresponding to the adsorbent being in equilibrium with the high initial concentration of the contaminant in distinction from the low utilization when adsorbent works in equilibrium with the low output concentration. In the particular instance the membrane device comprises a lumen of a bundle of hollow fibers with silica dispersion flowing either inside or outside of the fibers and wastewater flowing on the opposite side of the fiber membrane. This process eliminates step of separating silica from the wastewater. It opens way to use colloidal silica as adsorbent with highly developed surface area. Continuous monitoring of the silica particles zeta potential yields information for preventing colloidal silica solidification within the device. Solidification of the colloidal silica afterwards solves problem of untreated residual discharge.

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